Dougl 2174

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Kiyoshi MIYASHITA et al.

Attn: **Mail Stop Applications Branch**

Application No.: 10/031,744

Filed: January 25, 2002

Docket No.: 111776

For: PROJECTOR

SUBMISSION OF TRANSLATIONS OF PRIORITY DOCUMENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith are translations of priority documents, JP2000-161859, filed May 31, 2000 and JP2000-230905, filed July 31, 2000. Upon information and belief, the translation is an accurate English translation of these applications.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Randi B. Isaacs
Registration No. 56,046

Linda M. Saltiel
Registration No. 51,122

JAO:RBI/aaw

Date: July 11, 2005

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

CERTIFICATION

IN THE MATTER of

U.S. Patent Application
Serial No. 10/031,744
of Seiko Epson Corporation

I, Yoshichika Inoue, being duly qualified to translate from the Japanese language to the English language, hereby certify that I have translated the attached documents, Japanese Patent Application Nos. 2000-161859 and 2000-230905, filed in the Japanese Patent Office on May 31, 2000 and July 31, 2000 respectively, from the Japanese to the English language, and that the attached documents are true and correct translations of said Japanese documents.

Date: June 30, 2005

Yoshichika Inoue

[DOCUMENT NAME] PATENT APPLICATION
[REFERENCE NUMBER] PA04D524
[FILING DATE] May 31, 2000
[SUBMIT TO] The Director General of the J. P. O.,
Takahiko Kondo
[IPC] H04N 9/00
[INVENTOR]
[ADDRESS] c/o Seiko Epson Corporation
3-5, Owa 3-chome, Suwa-shi, Nagano-ken
[NAME] Kiyoshi Miyashita
[INVENTOR]
[ADDRESS] c/o Seiko Epson Corporation
3-5, Owa 3-chome, Suwa-shi, Nagano-ken
[NAME] Miki Nagano
[INVENTOR]
[ADDRESS] c/o Seiko Epson Corporation
3-5, Owa 3-chome, Suwa-shi, Nagano-ken
[NAME] Masaru Kono
[INVENTOR]
[ADDRESS] c/o Seiko Epson Corporation
3-5, Owa 3-chome, Suwa-shi, Nagano-ken
[NAME] Shoichi Akaiwa
[INVENTOR]
[ADDRESS] c/o Seiko Epson Corporation
3-5, Owa 3-chome, Suwa-shi, Nagano-ken
[NAME] Kazuyoshi Nakamura
[APPLICANT]
[IDENTIFICATION NUMBER] 000002369
[NAME] Seiko Epson Corporation
[ATTORNEY]
[IDENTIFICATION NUMBER] 100096817
[PATENT ATTORNEY]
[NAME] Takao Igarashi
[TELEPHONE NUMBER] 052-218-5061
[APPOINTED ATTORNEY]

[IDENTIFICATION NUMBER] 100097146
[PATENT ATTORNEY]
[NAME] Takashi Shimoide
[APPOINTED ATTORNEY]
[IDENTIFICATION NUMBER] 100102750
[PATENT ATTORNEY]
[NAME] Hiroshi Ichikawa
[APPOINTED ATTORNEY]
[IDENTIFICATION NUMBER] 100109759
[PATENT ATTORNEY]
[NAME] Mitsuhiro Kato
[FILING FEE]
[PRE-PAYING ACCOUNT NUMBER] 007847
[AMOUNT] 21000
[LIST OF DOCUMENTS]
[DOCUMENT] Specification 1
[DOCUMENT] A set of drawings 1
[DOCUMENT] Abstract Sheet 1
[GENERAL POWER OF ATTORNEY NUMBER] 9502061
[GENERAL POWER OF ATTORNEY NUMBER] 9904030
[NECESSITY OF PROOF] Necessary

[DOCUMENT NAME] SPECIFICATION

[TITLE OF THE INVENTION] PROJECTOR

[SCOPE OF CLAIMS FOR PATENT]

[Claim 1] A projector capable of connection to a network, said projector comprising:

a network connection means for sending and receiving data over a network;

an image data generating means for generating image data for display, based on data received via said network connection means; and

a projection display means for projecting said generated image data.

[Claim 2] A projector according to claim 1 wherein data received by said image data generating means is screen data, and said mage data generating means executes a client application and generates said image data on the basis of said screen data.

[Claim 3] A projector according to claim 1 wherein said image data generating means executes a viewer application and generates said image data on the basis of said received data.

[Claim 4] A projector according to claim 1 wherein said image data generating means identifies the data format of said received data, executes a suitable viewer application for the identified data format, and generates said image data.

[Claim 5] A projector according to any of claims 1 to 4 further comprising an external input signal receiving means for receiving an external input signal from an external input means.

[Claim 6] A projector according to claim 5 further comprising:

an identifier for uniquely identifying itself from other projectors; and

wherein said external input means comprises an identifier

selecting means for selecting said identifier, enabling unique input to one desired projector from among a plurality of projectors.

[Claim 7] A projector according to claim 5 or 6 wherein said external input means transmits an input signal to said external input signal receiving means by wireless means.

[Claim 8] A projector according to any of claims 1 to 7 wherein said projection display means comprises an electro optical data output portion, a light source for illuminating the electro optical data output portion, and a lens for enlarging images projected by the light source.

[Claim 9] A projector according to any of claims 1 to 8 wherein said projector functions as a terminal device for an application service provider (ASP).

[Claim 10] A display system wherein results of operations performed by a server are displayed via a plurality of projectors connected over a network, wherein said server comprises:

display screen data generating means provided for each said projector, for executing operations in response to a request from each of said projector and generating display screen data; and

display screen data transmitting means for transmitting said generated display screen data to said projector requesting said operations; and

said projector comprises:

transmitting/receiving means for transmitting a request for said operations to said server via said network and receiving said display screen data transmitted from said server;

image data generating means for generating image data for display on the basis of said received display screen data; and

projection display means for projecting said generated image data.

[Claim 11] A display system according to claim 10 wherein display screen data generated by said display screen data generating means of said server has a unique format and consists of differential data for previous display screen data and current display screen data, and

said image data generating means of said projector uses a client application to generate said image data on the basis of said display screen data.

[Claim 12] A display system according to claim 10 or 11 wherein said projector is a projector for an application service provider (ASP).

[Claim 13] A method for displaying images via a projector connected to a network, comprising:

in a server connected to said network,

executing an application in response to a request from said projector; and

transmitting to said requesting projector via said network user interface data resulting from execution of said application; and

in said projector,

receiving said transmitted user interface data;

generating image data for display on the basis of said received user interface data; and

projecting said generated image data.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Field of the Invention]

The present invention relates to a projection type display device (projector) connectable to a network, and to a method for displaying images over a network. More specifically, the present invention relates to a projector for an application service provider (ASP).

[0002]

[Prior Art]

Projection type display devices (projectors) to date are typically connected via a video cable to an image generating device, for example, a video cassette recorder or computer. A computer-generated analog RGB signal is input to the projector via a video cable and projected as an image on a screen or the like. Thus, conventional projectors function as simple stand-alone projectors.

[0003]

With expansion of networks in recent years, there have been developed technologies for shifting the bulk of processing to server computers in order to reduce the load on client computers. In application service provider (ASP) technologies, for example, an application program (hereinafter "application") requested is run on the server computer, and the results are transmitted to the client as HTML data or as display screen data in a proprietary format. With ASP technology, the client merely runs a client application and displays on its display a user interface (display screen information) in response to the received display screen data. Thus, relatively few functions are required of a client, allowing it to function as a so-called "thin client."

[0004]

Another development seen in recent years has been the increasing use of projectors for presentations at conferences and the like. Permanent projector installations in individual conference rooms are no longer rare.

[0005]

This state of affairs has led to a desire to connect projectors to networks. However, to date projectors have been designed on the assumption that they will be connected to a local computer, and thus network hookups have required the agency of a computer. This requires

providing one computer for each projector one wishes to connect to the network, posing a problem of inefficiency. Further, the computer and projector must be connected by a cable each time they are used, which obviates the convenience associated with networks. Another problem is that larger numbers of computers require more management resources. Also, additional convenience could be provided if projectors could function as terminal devices at ASPs.

[0006]

With the foregoing in view, it is an object of the present invention to provide a projector that can be connected to a network without through a computer. It is a further object to provide a projector capable of functioning as a client of a server computer. It is yet another object to provide a projector capable of functioning as an ASP terminal device at an ASP.

[0007]

[Means for Solving the Problems and its Functions/Effects]

In a first aspect, the invention achieves the stated object by providing a projector that can be connected to a network. The projector according to this first aspect of the invention comprises a network connection means for sending and receiving data over a network; an image data generating means for generating image data for display, based on data received via said network connection means; and a projection display means for projecting said generated image data.

[0008]

The projector according to this first aspect can be connected independently to a network, without being connected to a computer. The projector according to this first aspect can also function as a client of a server computer.

[0009]

In the projector according to this first aspect, data received by the image data generating means can be screen data, and the image data generating means can execute a client application to generate image data on the basis of this screen data. With such an arrangement, the projector can function as an ASP terminal device at an ASP.

[0010]

In the projector according to this first aspect, it also possible for the image data generating means to execute a viewer application to generate image data on the basis of received data. Alternatively, the image data generating means may identify the data format of received data and execute a suitable viewer application for the identified data format in order to generate image data. In this case, the received application data can be opened by the viewer application or application and displayed on the display screen (user interface) of the application.

[0011]

The projector according to this first aspect may further comprise a an external input signal receiving means for receiving an external input signal from an external input means. The projector pertaining to this first aspect may further comprise an identifier for uniquely identifying itself from other projectors, and the external input means may comprise an identifier selecting means for selecting said identifier, thereby enabling unique input to one desired projector from among a plurality of projectors. By providing this arrangement, a plurality of projectors can be controlled by a single external input means. That is, data, commands, etc. can be input individually to individual projectors.

[0012]

In the projector pertaining to this first aspect, the projection display means may comprise an electro optical data output portion, a light source for illuminating the electro optical data output portion, and

a lens for enlarging images projected by the light source. In the projector pertaining to this first aspect, the projection display means may comprise an electro optical data output portion, a light source for illuminating the electro optical data output portion, and a lens for enlarging images projected by the light source.

[0013]

In the projector pertaining to this first aspect, the projector may function as a terminal device for an application service provider (ASP). This arrangement expands possible modes of ASP utilization.

[0014]

In a second aspect, the invention provides a display system wherein results of operations performed by a server computer are displayed via a plurality of projectors connected over a network. In the display system of this second aspect the server computer comprises display screen data generating means provided for each projector, for executing operations in response to a request from each projector and generating display screen data; and display screen data transmitting means for transmitting the generated display screen data to the projector requesting the operations; and

the projector comprises transmitting/receiving means for transmitting a request for operations to the server computer via the network and receiving display screen data transmitted from the server computer; image data generating means for generating image data for display on the basis of the received display screen data; and projection display means for projecting the generated image data.

[0015]

According to the display system which pertains to the second aspect of the invention, a projector may be connected to a network without the aid of a computer. The projector can also function as an ASP

terminal at an ASP.

[0016]

In the display system which pertains to this second aspect, display screen data generated by display screen data generating means of the server computer may have a unique format and consist of differential data for previous display screen data and current display screen data, and the image data generating means of the projector may use a client application to generate the image data on the basis of the display screen data.

[0017]

In the display system which pertains to this second aspect, the projector may be a projector for an application service provider (ASP). This arrangement expands possible modes of ASP utilization.

[0018]

In a third aspect, the invention provides a method for displaying images via a projector connected to a network. The method pertaining to this third embodiment of the invention comprises the steps of

in a server computer connected to the network, executing an application in response to a request from the projector and transmitting to the requesting projector via the network user interface data resulting from execution of the application; and

in the projector, receiving the transmitted user interface data, generating image data for display on the basis of the received user interface data, and projecting the generated image data.

[0019]

According to the method of this third aspect, a projector may be connected to a network without the aid of a computer. A projector may also be used via a network. The projector may serve as the client.

[0020]

[Embodiments of the Invention]

A fuller understanding of the projection type display device, i.e. projector, of the invention is provided through the following description in the indicated order, making frequent reference to the accompanying drawings.

A. Projector Arrangement in a First Embodiment

B. Basic Operation of Projector According to the First Embodiment

C. Working Examples of Projector 10 Pertaining to the First Embodiment

(a) Second Embodiment Serving as First Working Example

(b) Third Embodiment Serving as Second Working Example

(c) Fourth Embodiment Serving as Third Working Example

(e) Fifth Embodiment Serving as Fourth Working Example

[0021]

A. Projector Arrangement in a First Embodiment

The following description of the arrangement of a projection type display device, i.e. projector pertaining to a first embodiment makes reference to Figs. 1 and 2. Fig. 1 is an illustrative diagram showing an exemplary arrangement for a projector pertaining to a first embodiment. Fig. 2 is a block diagram showing the internal circuit arrangement of the projector of the first embodiment.

[0022]

Projector 10 is installed, for example, suspended from the ceiling as depicted in Fig. 1, and acquires necessary data and commands via a network line NL. Commands and data may be input to projector 10 via a wireless external input device 40, for example, a wireless keyboard 401 or wireless mouse 402. Images from projector 10 are projected onto a projection screen SCR or other projection surface.

[0023]

The following description of the internal arrangement of the projector 10 of the first embodiment makes reference to Fig. 2. Projector 10 comprises an ASP terminal portion 20 primarily functioning as an ASP terminal, and a projector portion 30 primarily functioning as a conventional projector. That is, the projector 10 of the first embodiment can function as an ASP terminal for an ASP.

[0024]

ASP terminal portion 20 comprises a first central processing unit (CPU) 200 for executing operations of various kinds, including executing viewer applications and client applications for the ASP; a first read-only memory (ROM) 202 storing various programs, including viewer applications and client applications for execution by first CPU 200; and a first random access memory (RAM) 204 for temporarily storing results of operations by first CPU 200, data, etc. First CPU 200 and first ROM 202 are connected so as to enable one-way or two-way communication; first CPU 200 and first RAM 204 are connected so as to enable two-way communication.

[0025]

ASP terminal portion 20 further comprises a graphics controller 210 connected to first CPU 200 so as to enable two-way communication, for generating image data in response to a Draw command from first CPU 200. Graphics controller 210 has an LSI chip (not shown) for generating images, and video memory (VRAM) for storing generated images (display images).

[0026]

As interfaces for exchanging commands and data between projector 10 and external devices, ASP terminal portion 20 further comprises a network interface controller 220, an I/O port 230, a PCMCIA interface controller 240, and a USB controller 250. Network interface

controller 220 is, for example, an Ethernet controller for converting commands and data sent from ASP terminal portion 20 to network line NL to a format appropriate to the network communications protocol, or converting signals received over network line NL to a format suitable for processing by ASP terminal portion 20. I/O port 230 is an ordinary input/output port, connected via an identifying circuit 232 to a wireless input device 234, and also to an external input device 40 and to a second CPU 300 of projector portion 30. Wireless input device 234 is an input device for receiving input data via wireless transmission from a wireless input device, and identifying circuit 232 identifies whether received by wireless input device 234 is input data specifically transmitted to it.

[0027]

PCMCIA interface controller 240 is a controller for transferring data from ASP terminal portion 20 to an external device and transferring data from an external device to ASP terminal portion 20 according to the PCMCIA standard; it is connected, for example, to an external storage device 41. USB controller 250 is a controller for transferring data between ASP terminal portion 20 and an external device according to the USB standard, and is connected, for example, to external input device 40 via a USB hub 252.

[0028]

ASP terminal portion 20 further comprises a real time clock 260 for providing absolute time in ASP terminal portion 20, and a sound source 262 for generating sound data in response to a command from first CPU 200.

[0029]

In ASP terminal portion 20 the first CPU 200 and the various controllers are interconnected via a bus for data and command exchange.

[0030]

The arrangement of projector portion 30 is now described. Projector portion 30 comprises a second central processing unit (CPU) 300 for executing a predetermined program to control the various circuits of projector portion 30; a second read-only memory (ROM) 302 for storing the program for execution by the second CPU 300; and a second random access memory (RAM) 304 for temporarily storing results of operations by second CPU 300, data, etc. Second CPU 300 and second ROM 302 are connected so as to enable one-way or two-way communication; second CPU 300 and second RAM 304 are connected so as to enable two-way communication.

[0031]

Projector portion 30 further comprises a video signal conversion circuit 310, an audio control circuit 320, a liquid crystal (LCD) drive circuit 330, a light source drive circuit 340, a cooling fan control circuit 350, and a projection optical system 360.

[0032]

Video signal conversion circuit 310 performs an analog/digital conversion function, a decoding function, a sync signal separation function, and an image processing function. Specifically, video signal conversion circuit 310 converts an analog video signal or digital video signal input from an external video signal input terminal 312 into a digital video signal, and in sync with the sync signal writes the converted digital video signal to a frame memory (not shown) in video signal conversion circuit 310, or reads from frame memory digital video data that has been written to the frame memory. Analog signals include, for example, an RGB signal output from a personal computer, or a composite video signal output from a video tape recorder, etc. Where the analog signal is a composite video signal, video signal conversion circuit 310 demodulates the composite video signal and separates it into

the component video signals, which are composed of the three color signals RGB, and the sync signal, and converts the component video signals into digital video data. Where the analog signal is an RGB signal output from a personal computer, as the signal is input in the form of the native component video signals, with the sync signal separate, a separation process is unnecessary, so the video signal conversion circuit 310 simply converts the component video signals into digital video data.

[0033]

Video signal conversion circuit 310 can also input digital signals transmitted from the graphics controller 210 of ASP terminal portion 20. In this case, the native digital signal is input and the sync signal is supplied separately, so analog/digital conversion and separation processes are not needed.

[0034]

Audio control circuit 320 is connected to an external audio signal input terminal 322, a speaker 324, second CPU 300, and the sound source 262 of ASP terminal portion 20. Audio control circuit 320 is connected to second CPU 300, and under instructions from second CPU 300 drives speaker 324 by means of a drive signal generated from an audio signal or from sound data transmitted from external audio signal input terminal 322 or sound source 262.

[0035]

LCD drive circuit 330 receives image data processed by video signal conversion circuit 310 and drives LCD 332 according to the received image data to modulate the illumination from light source 342. The modulated illumination is projected via a lensed projection optical system onto a projection surface, for example, a projection screen. Light source control circuit 340 is connected to light source 342; this light

source control circuit 340 controls the ON/OFF etc. of light source 342 under instructions from second CPU 300. To the rear of light source 342 is arranged a cooling fan 352 for directing cooling air onto light source 342. Cooling fan 352 is connected to cooling fan control circuit 350, and cooling fan control circuit 350 controls the operating speed, etc. of cooling fan 352 under instructions from second CPU 300.

[0036]

B. Basic Operation of Projector According to the First Embodiment

The following description of basic operation of a projector 10 pertaining to the first embodiment comprising the above arrangement makes reference to Figs. 1 and 2.

[0037]

A signal input to projector 10 via network line NL is converted by the network interface controller 220 of ASP terminal portion 20 to a format appropriate for the ASP terminal portion 20, and data and commands are transferred to first CPU 200. First CPU 200 temporarily places the transferred data in first RAM 204 and determines if a transferred command is a command addressed to ASP terminal portion 20 or a command addressed to projector portion 30. If a transferred command is addressed to projector portion 30, first CPU 200 transfers the command to the second CPU 300 of projector portion 30 via I/O port 230.

[0038]

Where a transferred command is directed to the ASP terminal portion 20, on the other hand, first CPU 200 executes operations on the basis of the transferred command. For example, the first CPU 200 reads and loads a viewer application suitable for the data stored in the first RAM 204 from the first ROM 202, and generates user interface data from the data in first ROM 202, which is then transferred to graphics

controller 210 together with a Draw command. Where projector 10 alternatively functions as a server computer based computing (SBC) client, described later, the corresponding client application is loaded, and a Draw command is transmitted to graphics controller 210 to generate user interface screen data from received display screen data having a unique format. In response to the received Draw command, graphics controller 210 generates user interface data or user interface display screen data for display on the basis of display screen data (hereinafter "image data") which is then stored in VRAM 212 in graphics controller 210.

[0039]

Under an instruction from first CPU 200, graphics controller 210, at a predetermined timing, reads image data placed in VRAM 212 in graphics controller 210, and transfers it to the video signal conversion circuit 310 of projector portion 30. First CPU 200 receives a command or data from external input device 40 via USB hub 252, USB controller 250 or I/O port 230. In accordance with a command received via external input device 40 or network line NL, first CPU 200 takes data placed in first RAM 204 or image data placed in the VRAM 212 of graphics controller 210 via PCMCIA interface controller 240, and stores it in external storage device 41.

[0040]

When video signal conversion circuit 310 receives image data from graphics controller 210 it executes the routine described earlier and transfers the processed data to LCD drive circuit 330. LCD drive circuit 330 drives LCD 332 in response to the received image data so that the desired image data is projected onto the projection screen.

[0041]

When a command received by second CPU 300 from, for example,

network line NL via I/O port 230, is a command instructing it to turn light source 342, it turns on light source 342 via light source control circuit 340. In response to the temperature of light source 342, second CPU 30 controls the operating status (fan speed, timing, etc.) via cooling fan control circuit 350.

[0042]

Data transmission from projector 10 to network line NL is performed by network interface controller 220 under instructions from first CPU 200.

[0043]

As described hereinabove, the projector 10 pertaining to the first embodiment can function as a terminal device in an ASP. Projector 10 can be connected to a network, and control thereof and data transmission can be accomplished via network line NL. In the first embodiment the designation "ASP terminal portion 20" is used, but it is not always necessary to use the "ASP terminal portion" designation, it being possible to use the designation "network terminal portion". That is, it is sufficient only if it is capable of sending and receiving commands and data via network line NL.

[0044]

C. Working Examples of Projector 10 Pertaining to the First Embodiment

The following describes working examples, in which the projector 10 of the first embodiment furnished with the above arrangement is applied to various modes for practice thereof, with reference to several embodiments.

[0045]

(a) Second Embodiment Serving as First Working Example

The following description of a second embodiment serving as a first

working example wherein a plurality of projectors 10 according to the first embodiment are controlled by a single external input device 40 makes reference to Fig. 3. Fig. 3 is an illustrative diagram depicting control of a plurality of projectors 10 by a single external input device 40 according to this second embodiment.

[0046]

As noted, the projector 10 according to the first embodiment comprises an identifying circuit 232 whereby individual projectors 101, 102, 103 ... 10n (10) may be uniquely identified. Accordingly, where external input device 40 comprises an identifying code generating circuit 404, a target projector display window 405, and a wireless output device 406, one can individually control a plurality of projectors 101, 102, 103 ... 10n using a single external input device 40. This is useful, for example, where independent images are projected using a plurality of projectors 10 in a presentation, or where a single superimposed image is projected by two projectors 10. The plurality of projectors 101, 102, 103 10n are interconnected via network line NL and also connected to a server computer (not shown).

[0047]

In actual practice, first, a key combination is input to external input device 40 to select a projector 10 to which it is desired to input a command or data by means of external input device 40. A possible key combination is a combination of the CTRL key and a number key. Once a key combination is input, identifying code generating circuit 404 generates a unique identifying code for the selected projector 101, 102, 103 ... 10n and displays the number of the selected projector 10 in the target projector display window 405. In the illustrated example, a "2" is displayed in the target projector display window 405, indicating that the second projector 102 has been selected.

[0048]

By subsequently pressing a key on external input device 40, a character key, for example, the identifying code generated by identifying code generating circuit 404 is appended to the transmitted data and transmitted from wireless output device 406 to the wireless input device 234 of projector 10. Transmitted data is composed of header information, the identifying code, a character code, and an end command, in that order.

[0049]

Upon receiving data transmitted from external input device 40 via wireless input device 234, each projector 101, 102, 103 ... 10n determines in the identifying circuit thereof whether the identifying code is the identifying code indicating itself. For example, when the first projector 101 receives the transmitted data in the present example, it will discard the received transmitted data since it does not contain the identifying code indicating itself. On the other hand, when the second projector 102 receives the transmitted data, since the transmitted data contains the identifying code indicating itself, it will transfer the received transmitted data to ASP terminal portion 20, and in ASP terminal portion 20 an image reflecting the operation results is projected from projector portion 30.

[0050]

Another procedure for selecting a projector 101, 102, 103 ... 10n besides inputting key combinations is to provide a plurality of switches on external input device 40 so that individual projectors 101, 102, 103 ... 10n can be selected by turning on an individual switch, or be turning on some combination of switches.

[0051]

In the second embodiment described hereinabove, an external

input device 40 capable of generating a plurality of identifying codes for projectors 101, 102, 103 ... 10n each having a unique identifying code is used to input commands or data, thereby allowing a plurality of projectors 101, 102, 103 ... 10n to be individually controlled by means of a single external input device. Accordingly, there is no need to provide a dedicated external input device 40 for each projector 101, 102, 103 ... 10n.

[0052]

(b) Third Embodiment Serving as Second Working Example

The following description of a third embodiment serving as a second working example of the projector 10 pertaining to the first embodiment makes reference to Figs. 4 -8. Fig. 4 is an illustrative diagram depicting in simplified form an arrangement of a network system in the third embodiment. Fig. 5 is a flow chart of a routine executed by a client computer upon receipt of a command. Fig. 6 is a flow chart of a routine executed by a server computer when a display image on a client is projected via a projector 10. Fig. 7 is a flow chart showing the details of a routine for data transmission in Fig. 6. Fig. 8 is an illustrative diagram depicting in conceptual form exchange of commands between a server computer, client, and projector 10.

[0053]

The following description of a network system embodying this third embodiment makes reference to Fig. 4. A server computer SC is connected via a network line NL to three client computers CC1, CC2, CC3, and a projector 10. The network address (a, b, c, d) is assigned to server computer SC, and the network addresses (a, b, c, 1), (a, b, c, 2), (a, b, c, 3) are assigned respectively to client computers CC1, CC2, CC3. The network address (a, b, c, 4) is assigned to projector 10. Server computer SC is provided with virtual environments A, B, C for each of

the client computers CC1, CC2, CC3, i.e., a "server based computing" (SBC) system architecture. Virtual environments A, B, C are created on the server computer SC to enable application programs to be run in response to requests from client computers CC1, CC2, CC3, and appear as virtual independent operating environments to client computers CC.

[0054]

Each client computer CC1, CC2, CC3 comprises a network interface, input device, and display screen device (not shown), and function as terminal devices (ASP terminal devices) in an SBC system.

[0055]

In an SBC system, applications, for example a spreadsheet or word processor, are run on the server computer SC; only user interface data (virtual screen data) for the application is transmitted to the client computer CC. However, in an SBC system virtual screen data is displayed on the client computer CC associated with a particular virtual environment, which is inconvenient where a screen displayed on a single client computer CC is to be shared by several users. In the present working example, the projector 10 pertaining to the present embodiment is used to project the display screen displayed on a single client computer CC, improving convenience in cases where a display screen is shared by several users. For example, in a classroom situation, where a lesson involves each student operating a client computer CC, by projecting the display screen of one student's computer using projector 10, all of the students can share the display screen displayed on the client computer CC of the one student.

[0056]

The following description of operation of client computers CC, server computer SC, and projector 10 where the projector 10 of the present embodiment is implemented in the SBC system depicted in Fig.

4 makes reference to Figs. 5 -7. In the following description, A, B ... denote independent virtual operating environments created on server computer SC, and [A], [B] ... denote virtual screen data generated in the virtual environments on server computer SC.

[0057]

As shown in Fig. 4, virtual screen data [A], [B], [C] is created in each of the virtual operating environments A, B, C on server computer SC. The client computers CC1, CC2, CC3 and projector 10 (hereinafter "clients") receive a command via network line NL (Step S100).

[0058]

Referring to Fig. 5, each client determines if the address indicated by the received command matches its own network address (Step S110). If determined that it does not match its own network address (Step S110: No), it ignores the received command (Step S130). If, on the other hand, the client determines that the address indicated by the received command matches its own network address (Step S110: Yes), it draws a display for the virtual screen data (Step S120). The data sequence transmitted from server computer SC contains, for example, the sequence: (indicated network address/virtual screen data [X]); where client computer CC1 is indicated, this sequence will be: (a, b, c, 1/[A]).

[0059]

The following description of a routine for displaying on projector 10 a display screen displayed on a client computer CC and for erasing a screen displayed on projector 10 makes reference to Fig. 6. To simply the description, client computer CC1 is used as a representative example.

[0060]

When client computer CC1 detects key input from an input device, it transmits the key input information to server computer SC.

[0061]

Server computer SC waits for key input from client computer CC1 (Step 200: No), and if key input has occurred (Step 200: Yes) it determines whether the key input is a command to turn on screen echo (Step S210). Here, "screen echo" indicates a command for the projector 10 to project an image. If the server computer SC determines that the key input is a command to turn on screen echo (Step S210: Yes) it turns on an ECHO flag (Step S220) and indicates that screen echo is on (Step S230). Server computer SC then executes data output processing (Step S240) and terminates the routine.

[0062]

If, on the other hand, a display screen displayed on projector 10 is to be erased, a command to turn off screen echo will be issued by means of key input from client computer CC1; therefore, server computer SC determines that the key input is a screen echo off command (Step S210: No) and then determines whether the ECHO flag is on (Step S250). If the server computer SC determines that the ECHO flag is not on (Step S250: No), it terminates the routine. If on the other hand server computer SC determines that the ECHO flag is on (Step S250: Yes), it turns the ECHO flag off (Step S260) and indicates that screen echo is off (Step S270). Server computer SC then executes data output processing (Step S240) and terminates the routine.

[0063]

The following detailed description of data output processing makes reference to Fig. 7. The server computer SC indicates the network address (terminal address) of the transmitting client computer CC (Step S2410). The server computer SC then executes the processing requested by the transmitting client computer CC, for example, a spreadsheet calculation or word processor text input, in the corresponding virtual

environment (Step S2420). The server computer SC then appends to the Answer command virtual display screen data [X] --namely, image data resulting from execution of the application in the virtual environment (Step 2430). That is, it appends to the Answer command user interface data (a screen for display on the display screen) for the application.

[0064]

The server computer SC then determines whether the ECHO flag is on (Step S2440), and if it determines that the ECHO flag is on (Step S2440: Yes), it indicates as the destination address the destination network address for display of display screen data on the display screen (i.e., the network address of projector 10), and appends this to the Answer command (Step S2450). The network address of projector 10 is assumed to be pre-registered with server computer SC. Alternatively, it could be appended automatically to an access request by projector 10 by means of a directory server or the like. Server computer SC appends to the end of the destination address virtual screen data [X] for projection by projector 10 (Step S2460), and transmits the Answer command to the transmitting client computer CC and projector via network line NL (Step S2470).

[0065]

In response to an echo on command from client computer CC1 (Fig. 8 (1)), server computer SC transmits the virtual screen data indicated by (2) in Fig. 8 to projector 10 and the transmitting client computer CC1. While not shown in Fig. 8, the command indicated by (1) in Fig. 8 also includes the network address of the transmitting device, and the server computer SC identifies the transmitting client computer CC from this network address.

[0066]

Upon receiving virtual screen data [A] from server computer SC,

as described earlier projector 10 loads a client application in ASP terminal portion 20, and graphics controller 210 generates image data from virtual screen data [A] for transmission to video signal conversion circuit 310. The image data generated by graphics controller 210 is projected onto projection screen SCR via video signal conversion circuit 310 and LDC drive circuit 330.

[0067]

If server computer SC determines that the ECHO flag is off (Step S4540: No), it transmits an Answer command, without appending a destination address, etc., to the transmitting client computer CC over network line NL. That is, in response to an EchoOff command from client computer CC1 ((3) in Fig. 8) server computer SC transmits to the transmitting client computer CC1 the virtual screen data indicated by (4) in Fig. 8. While not shown in Fig. 8, the command indicated by (3) in Fig. 8 also includes the network address of the transmitting device, and the server computer SC identifies the transmitting client computer CC from this network address.

[0068]

In the event that projector 10 does not receive virtual screen data [A] or does not receive differential screen data from server computer SC, it projects image data based on the last-received virtual screen data onto projection screen SCR. That is, it projects previously drawn data stored in the VRAM 212 of graphics controller 210 (or in the frame memory of video signal conversion circuit 310).

[0069]

According to the third embodiment described hereinabove, in an SBC, a display screen displayed on one of a plurality of client computers can be projected by projector 10. Accordingly, the display screen can be shared by a number of users, a function not possible in SBCs to date.

Projector 10 may function as a thin client, since there is no need for it to perform numerous functions.

[0070]

(c) Fourth Embodiment Serving as Third Working Example

The following description of a fourth embodiment serving as a third working example wherein the projector 10 pertaining to the first embodiment is operated remotely via a network line NL makes reference to Fig. 9. Fig. 9 is a flow chart of a routine for remote operation, via a network line NL, of a projector 10 pertaining to the first embodiment. A server computer or personal computer is connected to network line NL, enabling one-way management of a plurality of projectors 10 via these computers by means of remote operation.

[0071]

Upon receiving a command via network line NL, the first CPU 200 of ASP terminal portion 20 determines whether the received command is a command addressed to projector portion 30 (Step S500). Specifically, it determines whether the received command is, for example, a command relating to control of projector 10, such as a Lamp On command indicating that light source 342 (lamp) should be turned on. If the first CPU 200 determines that the received command is a command addressed to projector portion 30 (Step S500: Yes), it transfers the command to second CPU 300 via I/O port 230 (Step S510). If, on the other hand, CPU 200 determines that the received command is not a command addressed to projector portion 30 (Step S500: No), CPU 200 terminates the routine and executes the process instructed by the command.

[0072]

Upon receiving a command from first CPU 200, second CPU 300 analyzes the command (Step S520) to determine whether the received command is a Lamp On command (Step S530). If second CPU 300

determines that whether the received command is a Lamp On command (Step S530: Yes), it turns on light source 342 via light source control circuit 340 (Step S540).

[0073]

If second CPU 300 determines that the received command is not a Lamp On command (Step S530: No), it acquires status data for projector portion 30 (Step S550) and arranges the acquired status data in a predetermined order to generate a status sequence (Step S560). Projector portion 30 status data refers herein to status data relating to projection functions, for example, cumulative service time for light source 342, cooling fan 352 operating status, and light source (lamp) burnout. Second CPU 300 then transfers the generated sequence to first CPU 200 (Step S570).

[0074]

Upon receiving the status sequence, first CPU 200 sends the received status sequence to the requesting computer via network interface controller 220 (Step S580).

[0075]

The fourth embodiment employs the projector 10 according to the first embodiment that is furnished with an ASP terminal portion 20 capable of receiving commands and data, whereby the projector 10 may be operated remotely via a network line NL. For example, where a plurality of projectors 10 are provided, the status of each individual projector 10 can be ascertained by acquiring status data, without polling each individual projector 10. On the projector 10 side, the need to wait before operating the projector 10 is obviated, making it possible, for example, to both manage the projector 10 and control presentation data simultaneously by means of a personal computer. The command used in the preceding description of remote operation is merely exemplary;

naturally, various other commands besides a Lamp On command could be used.

[0076]

(d) Fifth Embodiment Serving as Fourth Working Example

The following description of a fifth embodiment serving as a fourth working example wherein the projector 10 pertaining to the first embodiment is used for "marking", e.g. writing on a projected image, makes reference to Figs. 10 -12. Fig. 10 is a flow chart of a routine for executing marking in the fifth embodiment. Fig. 11 is an illustrative diagram depicting in conceptual form a memory map in first RAM 204. Fig. 12 is an illustrative diagram depicting in conceptual form a memory map in VRAM 212.

[0077]

As shown in Fig. 11, when marking is initiated, first CPU 200 transfers the display screen data in graphics controller 210 to a screen data storage area in first RAM 204 (Step S600). The display screen data held in graphics controller 210 represents data for the image currently being projected by projector portion 30. First CPU 200 issues to graphics controller 210 a command disabling drawing to VRAM 212 (Step S610), thereby disabling drawing to VRAM 212 by the LSI chip in graphics controller 210.

[0078]

On the basis of marking data input via an external input device 40 (e.g. a mouse or tablet), first CPU 200 draws to an ink data storage area within first RAM 204, as shown in Fig. 11 (Step S620). First CPU 200 transfers the logical sum data of the ink data and the display screen data in first RAM 204 to the screen data storage area of VRAM 212 in graphics controller 210 (Step S630). As a result, image data, which consists of the original display screen data prior to marking plus the

appended ink data (see Fig. 12), is stored in the screen data storage area of VRAM 212. Screen data stored in VRAM 212 is associated, for example, with a date/time stamp data storage area containing date/time stamp data acquired from real time clock 260. Image data stored in the screen data storage area of VRAM 212 is projected via projector portion 30. As used herein, "ink data" refers to data held in first RAM 204, and corresponds to marking data input via an external input device 40 such as a mouse.

[0079]

First CPU 200 determines whether a Save command instructing that marked display screen data be saved has been input (Step S640). If a Save command has been input (Step S640: Yes), the logical sum data, which consists of the display screen data in first RAM 204 and the ink data, is transferred to external storage device 41 via PCMCIA interface controller 240 (Step S650). At this time, date/time stamp data stored in the date/time stamp data storage area may be transferred at the same time, using the date/time stamp data as a frame title.

[0080]

First CPU 200 then issues a Draw Enable command to the LSI chip of graphics controller 210, again allowing drawing in graphics controller 210 (Step S660).

[0081]

If first CPU determines that a Save command has not been input (Step S640: No), it issues a Draw Enable command to the LSI chip of graphics controller 210, allowing drawing in graphics controller 210 (Step S660), and then terminates the routine.

[0082]

According to the fifth embodiment, using the graphics controller 210 of the ASP terminal portion 20, display screen data being projected

via projector portion 30 can be marked via an external input device 40. Further, since the marked display screen data is stored in the VRAM 212 of graphics controller 210, the marked display screen data can be saved in an external storage device 41.

[0083]

The projector herein has been described with reference to certain preferred embodiments and working examples, which are merely intended to facilitate understanding of the invention and are not limiting thereof. Numerous modifications and improvements are possible within the spirit and scope of the invention as set forth in the claims, and such equivalents are covered with the scope of the invention.

[0084]

As noted hereinabove, in the first embodiment the network terminal portion is designated an "ASP terminal portion 20"; however, the projector 10 is not limited to an ASP terminal, and may simply receive application data (file) via a network, open the file with a viewer application, and project the display screen. Here, file format may be determined and the proper viewer loaded automatically at the projector 10 end, or a Run command instructing the projector 10 to load the proper viewer may be transmitted from the server together with the file.

[0085]

In the first embodiment, ASP terminal portion 20 and projector portion 30 are each provided with a CPU, RAM and ROM, but these may be provided to the ASP terminal portion 20 only. With such an arrangement, the CPU of the ASP terminal portion 20 will control the projector portion 30.

[0086]

In the first embodiment, projector portion 30 is provided with an external video signal input terminal 312 and an external audio signal

input terminal 322; however, where the projector is designed exclusively for network connection, these may be omitted, image data and audio data being supplied over network line NL.

[0087]

In the first embodiment there are provided a number of interface controllers, but any of these may be omitted, with the exception of the network interface controller 220.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1]

an illustrative diagram showing an exemplary arrangement for a projector pertaining to a first embodiment;

[Fig. 2]

a block diagram showing the internal circuit arrangement of the projector of the first embodiment;

[Fig. 3]

an illustrative diagram depicting control of a plurality of projectors 10 by a single external input device 40 according to a second embodiment;

[Fig. 4]

an illustrative diagram depicting in simplified form an arrangement of a network system in a third embodiment;

[Fig. 5]

a flow chart of a routine executed by a client computer upon receipt of a command in the third embodiment;

[Fig. 6]

a flow chart of a routine executed by a server computer when a display image on a client is projected via a projector 10 in the third embodiment;

[Fig. 7]

a flow chart showing the details of a routine for data transmission in Fig. 6;

[Fig. 8]

an illustrative diagram depicting in conceptual form exchange of commands between a server computer, client, and projector 10;

[Fig. 9]

a flow chart of a routine executed in a fourth embodiment, for remote operation, via a network line NL, of a projector 10 pertaining to the first embodiment;

[Fig. 10]

a flow chart of a routine for executing marking in a fifth embodiment;

[Fig. 11]

an illustrative diagram depicting in conceptual form a memory map in first RAM 204; and

[Fig. 12]

an illustrative diagram depicting in conceptual form a memory map in VRAM 212.

[Description of Symbols]

10 ... projector

20 ... ASP terminal portion

200 ... first CPU

202 ... first ROM

204 ... first RAM

210 ... graphics controller

212 ... VRAM

220 ... network interface controller

230 ... I/O port

232 ... identifying circuit

234 ... wireless input device

240 ... PCMCIA interface controller

250 ... USB controller

252 ... USB hub

260 ... real time clock (RTCLK)

262 ... sound source

30 ... projector portion

300 ... second CPU

302 ... second ROM

304 ... second RAM

310 ... video signal conversion circuit

312 ...external video signal input terminal

320 ... audio control circuit

322 ... audio signal input terminal

324 ... external speaker

330 ... LCD drive circuit

332 ... LCD

340 ... light source control circuit

342 ... light source

350 ... cooling fan control circuit

352 ... cooling fan

360 ... projection optical system

40 ... light source control circuit

404 ...identifying code generating circuit

405 ... target projector display window

406 ... wireless output device

410 ... keyboard

412 ... mouse

41 ... external storage device

CC1, CC2, CC3 ... client computer

SC ... server computer

NL ... network line

SCR ... projection screen

[DOCUMENT NAME] ABSTRACT

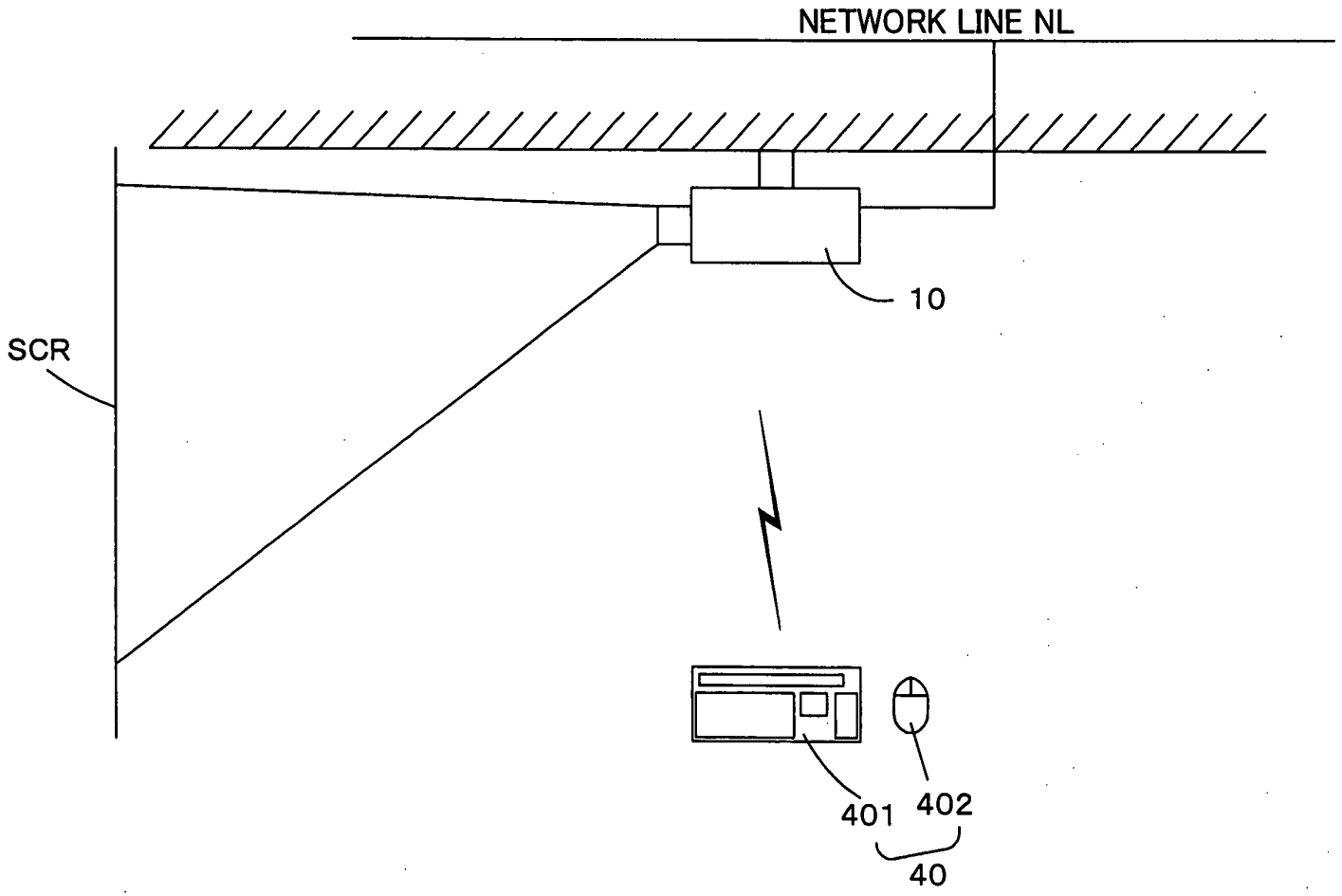
[ABSTRACT]

[OBJECTIVE] To provide a projector that can be connected to a network without through a computer.

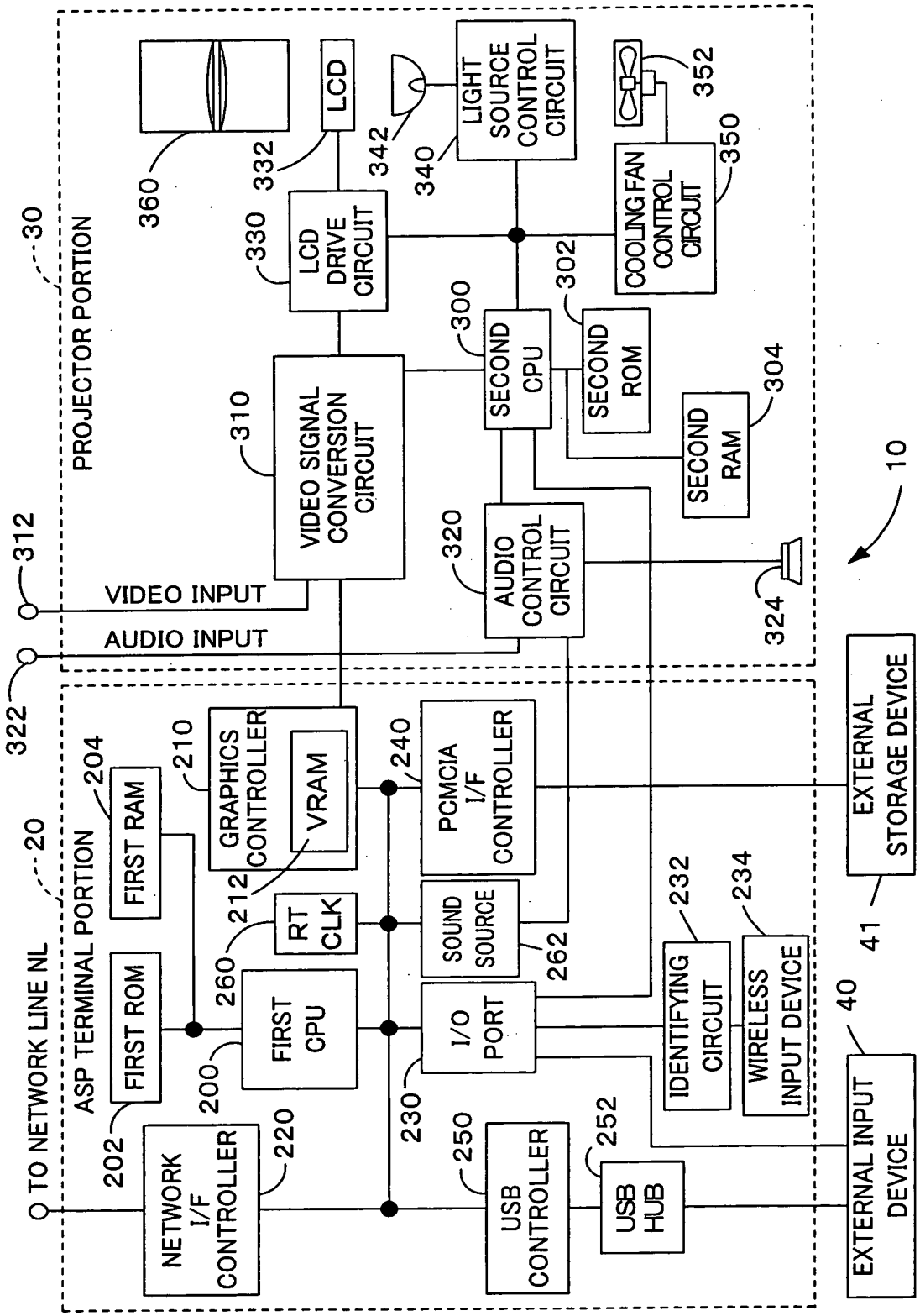
[MEANS FOR SOLVING] Commands and data transferred via a network line NL are input to an ASP terminal portion 20 via a network interface controller 220. A first CPU loads a client application corresponding to the command and generated user interface image data via a graphics controller 210. A video signal conversion circuit 310 receives image data from the graphics controller 210 and transfers the processed image data to an LCD drive circuit 330. LCD drive circuit 330 drives an LCD 332 in response to the received image data to project the desired image data onto a projection screen.

[SELECTED FIGURE] Fig. 2

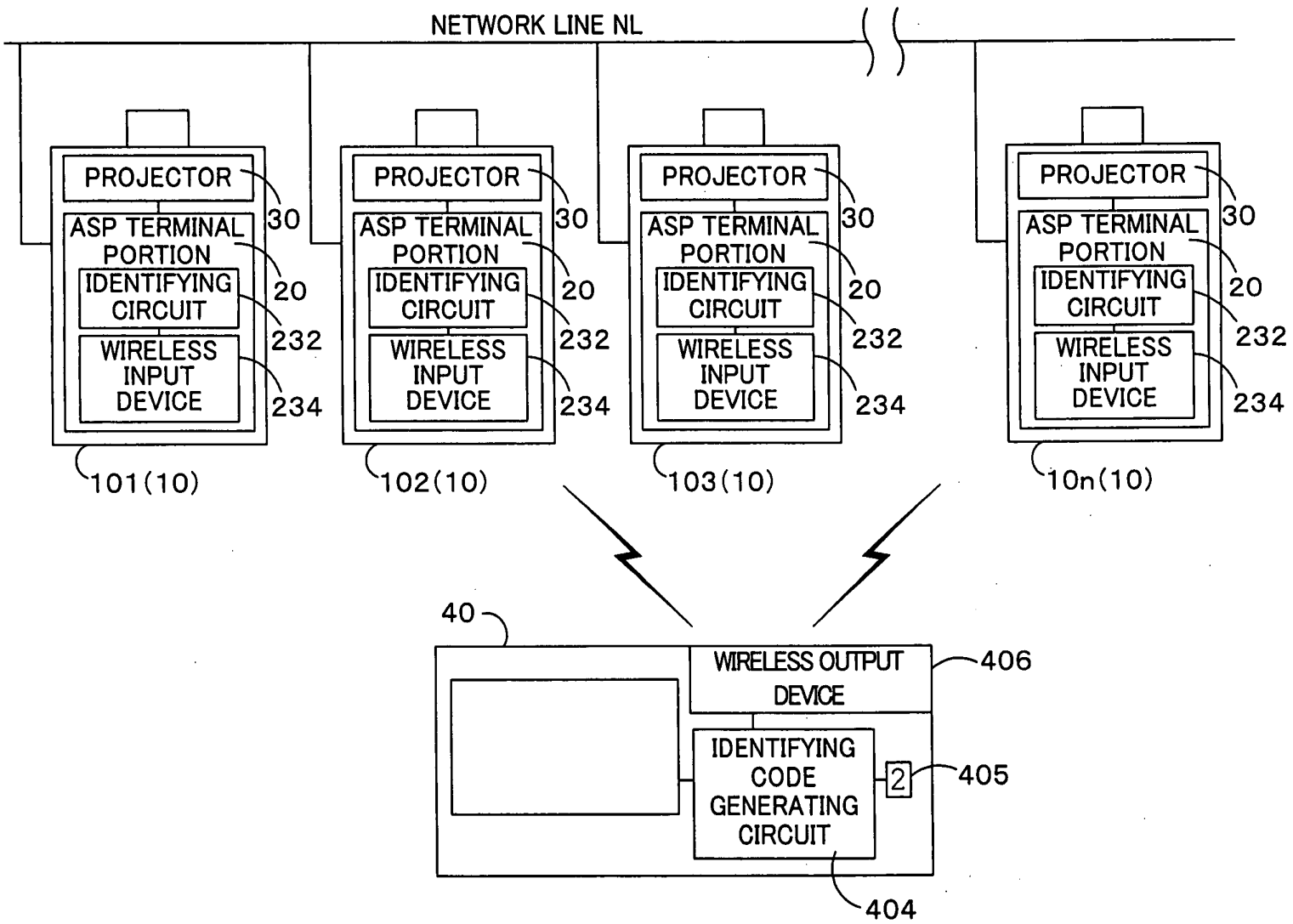
【DOCUMENT NAME】 DRAWINGS
【Fig.1】

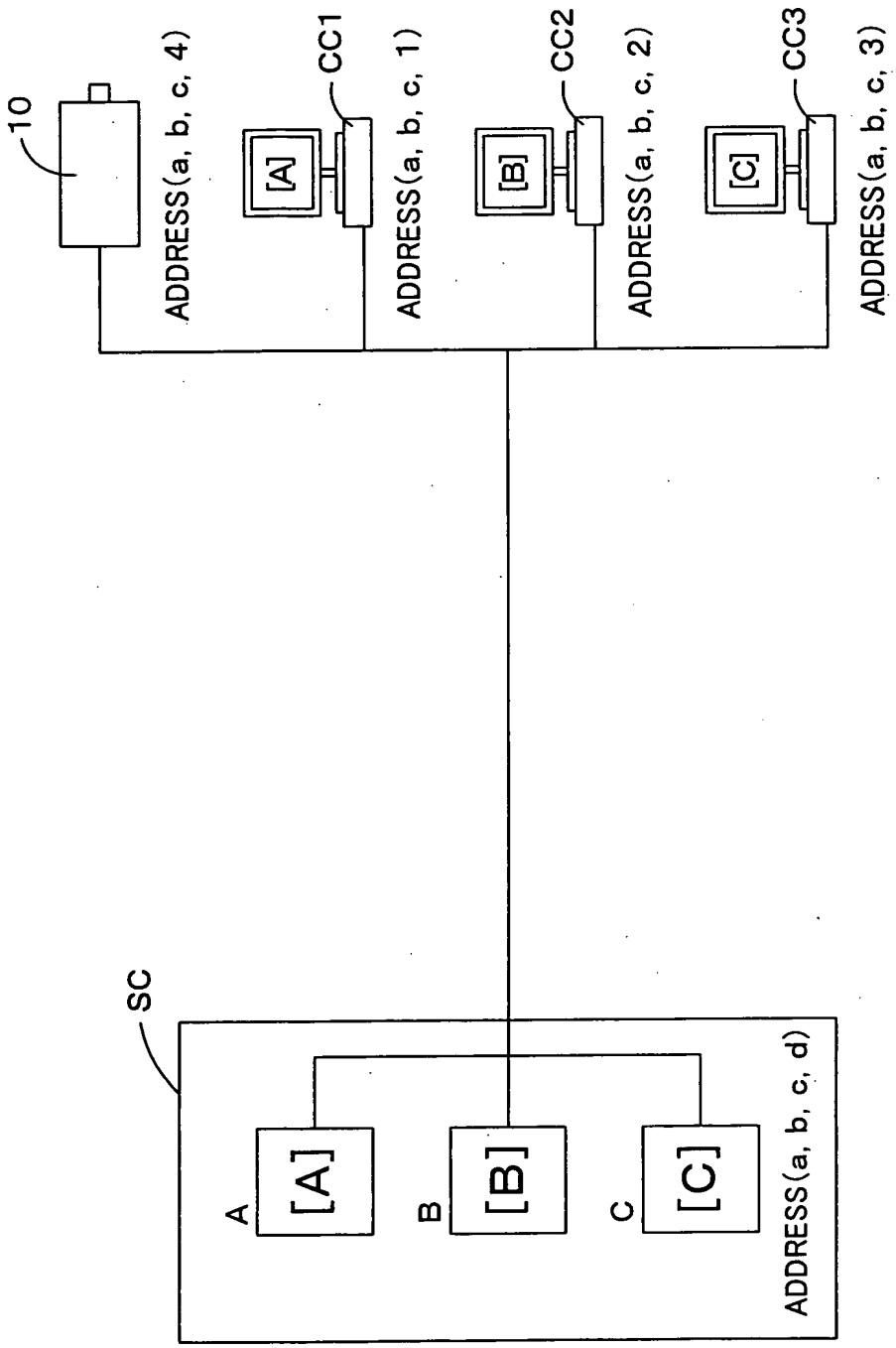


【Fig.2】



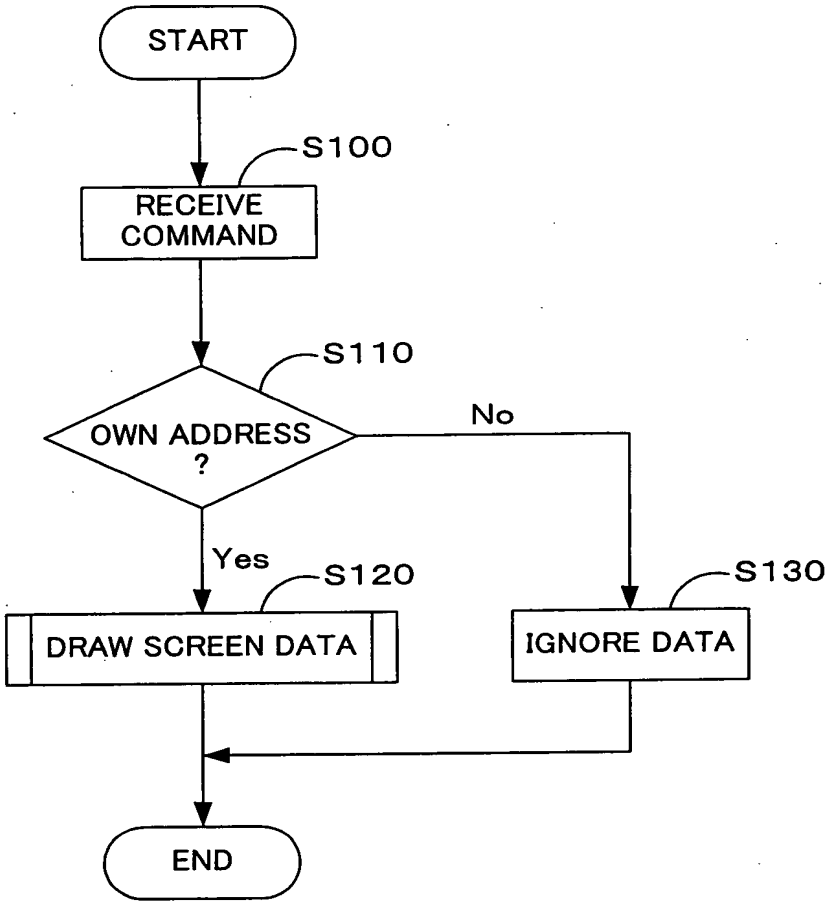
【Fig.3】



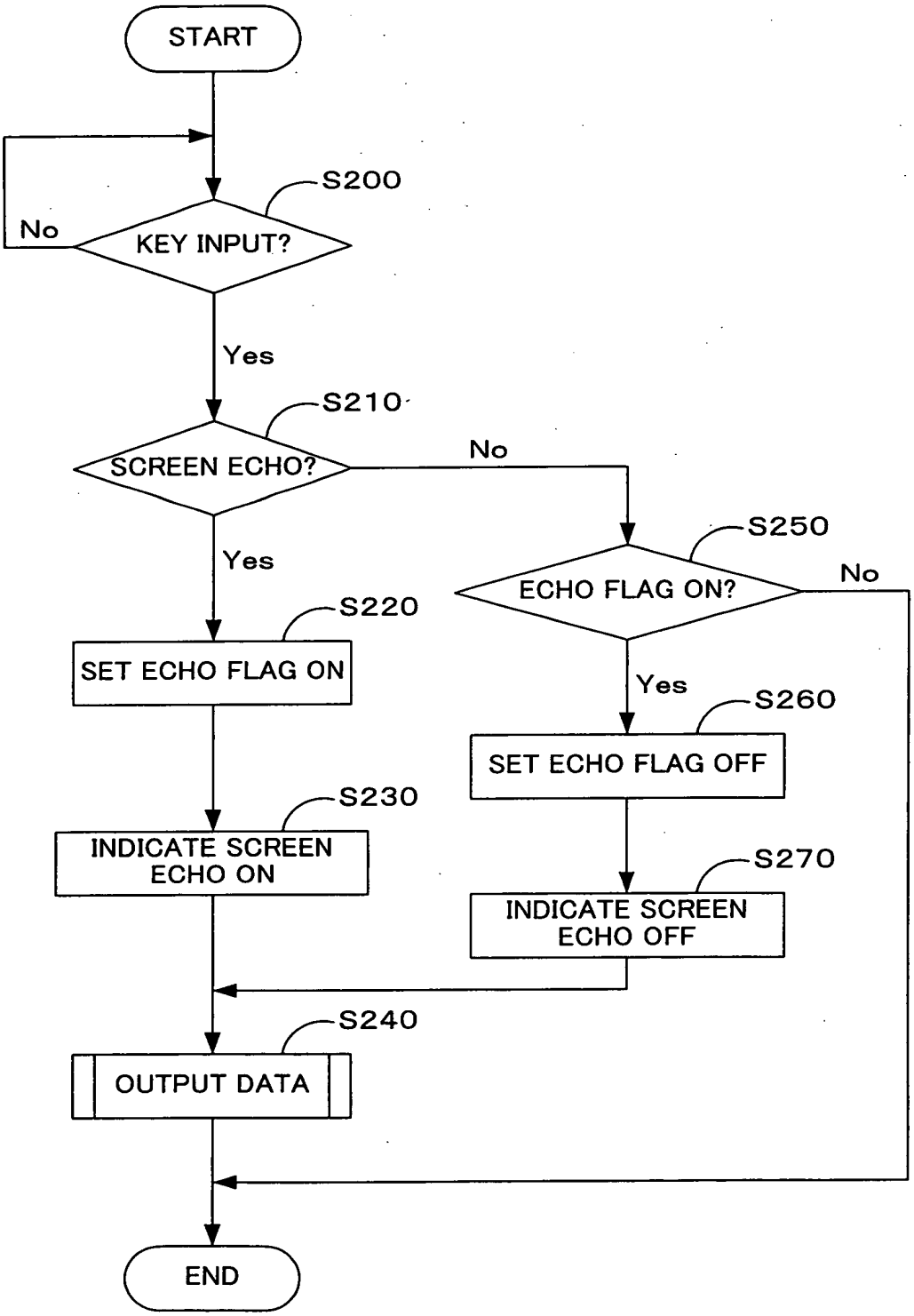


【Fig.4】

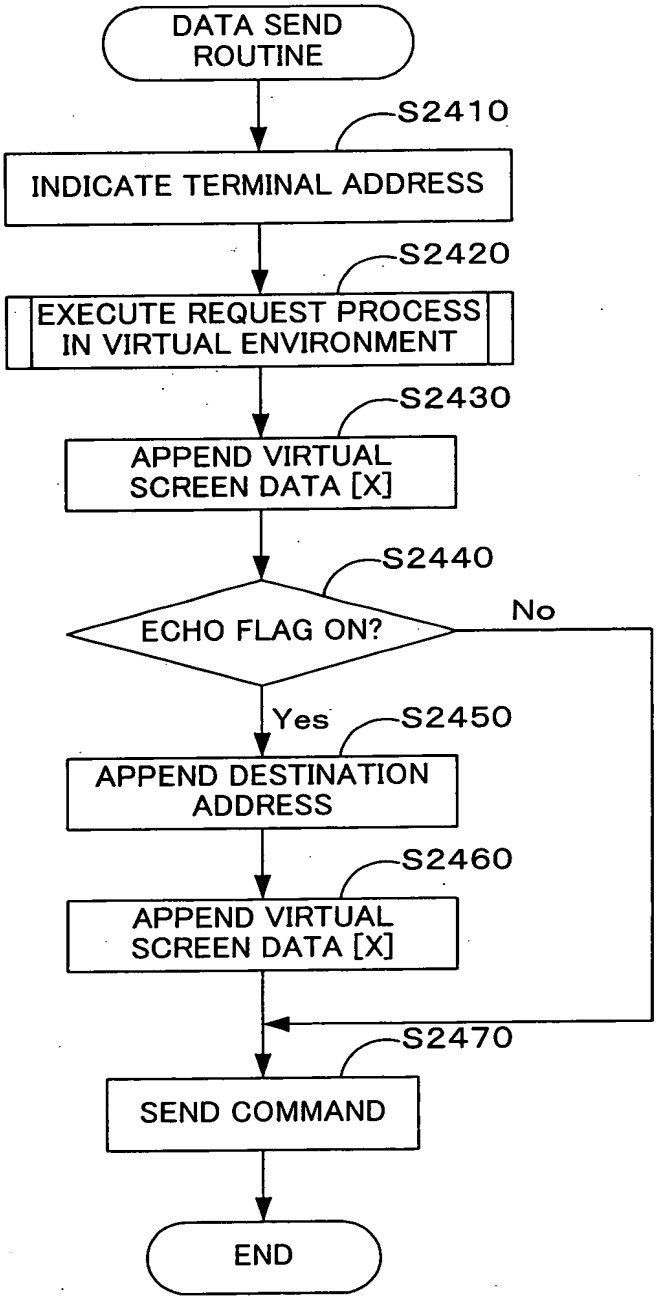
【Fig.5】



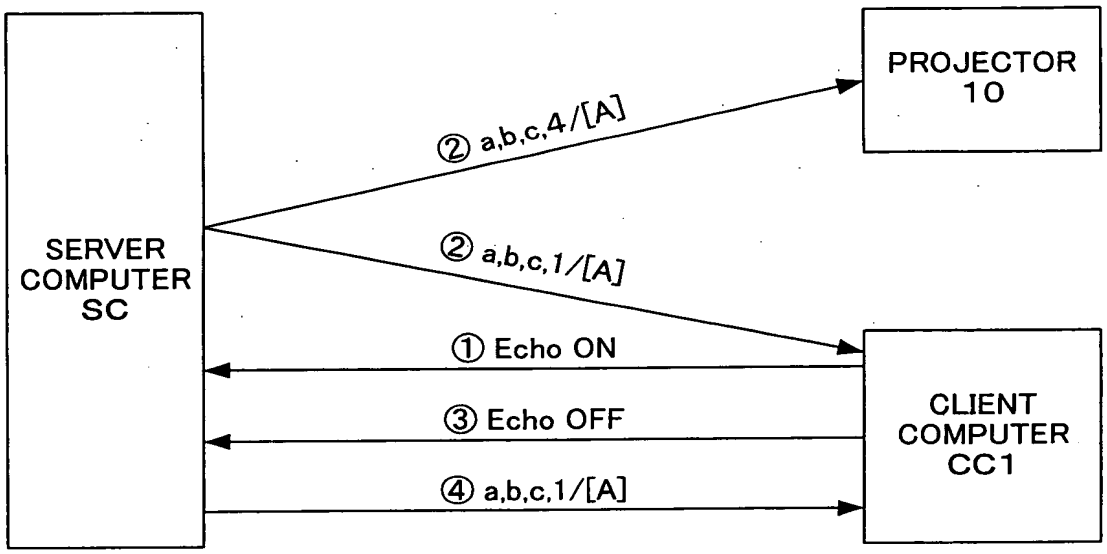
【Fig.6】



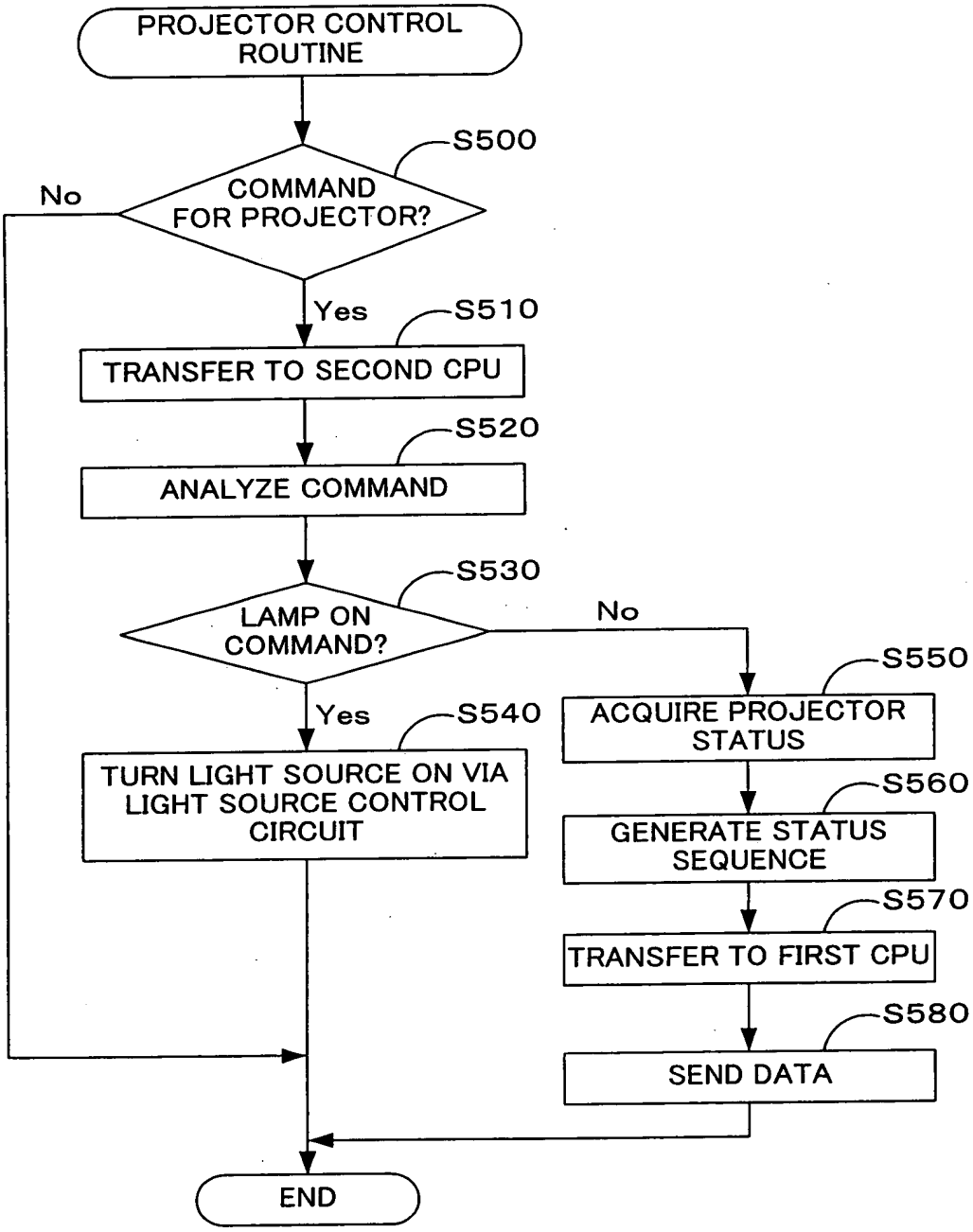
【Fig.7】



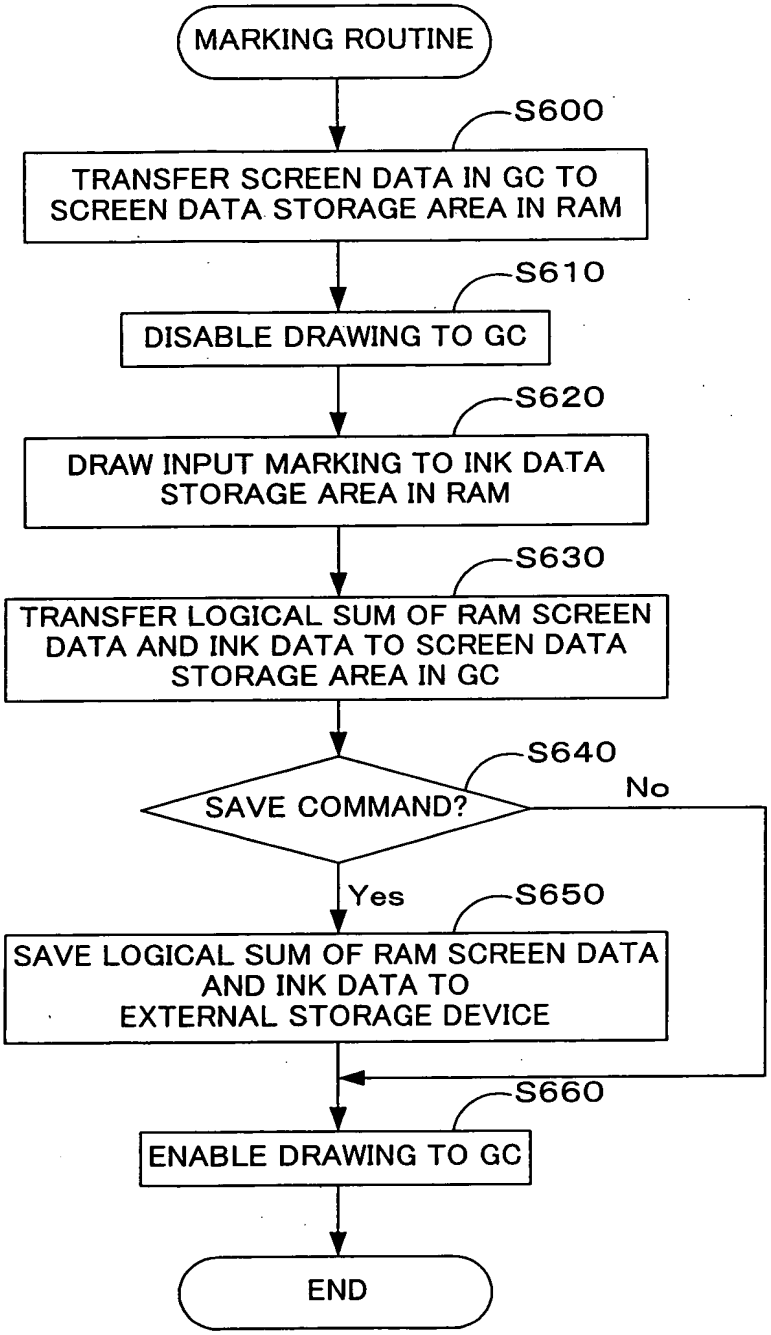
【Fig.8】



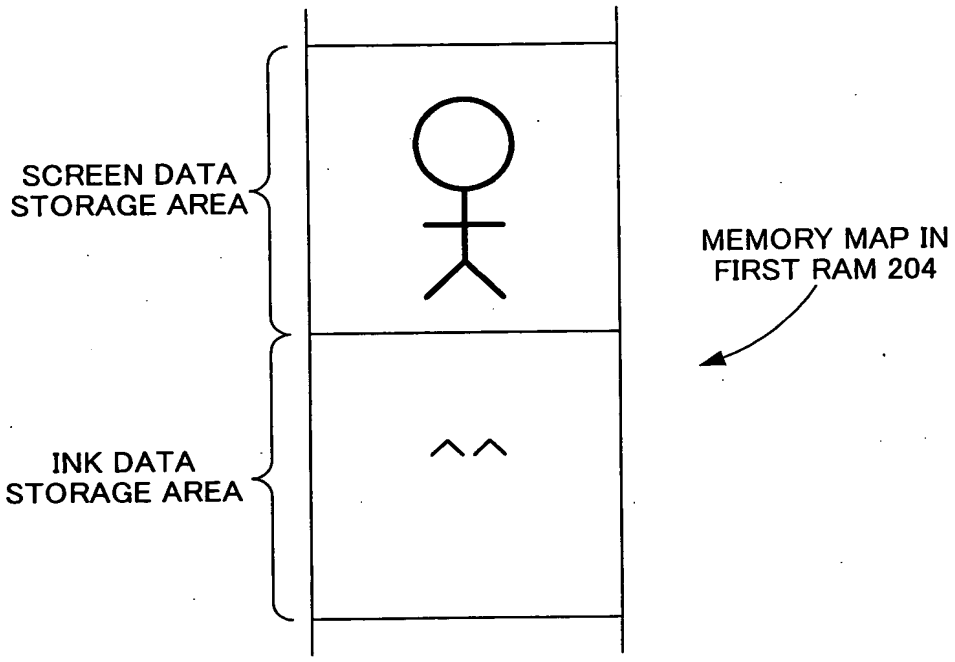
【Fig.9】



【Fig.10】



【Fig.11】



【Fig.12】